

Gravitational Islands Connected by the Chaining Web: A New Picture of Cosmic Structure and Causal Isolation

Judicael Brindel

Independent Researcher, Cotonou, Benin

ORCID: 0009-0007-4590-9874

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Abstract

We propose a new conceptual picture of cosmic structure based on two distinct levels of geometry and connectivity. At the global level, the universe is spatially flat — a neutral, homogeneous background filled uniformly by dark energy. At the local level, massive objects create gravitational islands: regions of curved spacetime where matter accumulates, stars form, and complexity grows. These islands are causally isolated from each other by the flat background — matter does not cross between them. However, the Chaining Force, propagating at $v \geq c$ along null geodesics through the entire flat background, constitutes a Chaining Web connecting all gravitational islands simultaneously. Stars and civilizations that never enter our gravitational island remain forever invisible to us — not only because of distance or dark energy, but because the geometry of the flat background does not route their matter through our local curvature. The Chaining Web is the only physical connection between these isolated worlds. This picture provides a new geometric interpretation of the Fermi paradox within the Chaining Force framework. This paper is explicitly speculative.

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1 The Flat Background and the Tablecloth Picture

1.1 Global flatness

Precision measurements of the cosmic microwave background — in particular by the Planck satellite — establish that the universe is spatially flat to within 0.4%. The global geometry is Euclidean: no preferred direction, no global curvature, no point toward which all matter converges.

This flatness is not trivial. A positively curved universe (spherical geometry) would cause all matter to converge toward a single point. A negatively curved universe (hyperbolic geometry) would cause matter to disperse too rapidly for structures to form. The precise flatness observed is what permits stable local structures — stars, galaxies, civilizations — to exist within a globally neutral background.

We call this background the **flat fabric**. It is filled uniformly by dark energy, which exerts no local force but drives the global expansion of the fabric itself.

1.2 The tablecloth picture

Consider a large flat tablecloth stretched uniformly over a table. The tablecloth is globally flat. The empty regions between objects are filled by dark energy — present everywhere, exerting a uniform outward pressure on the fabric itself, but indifferent to local events.

Place a heavy ball on the tablecloth. It creates a local depression — a gravitational island. Smaller objects near the ball roll toward it, captured by the local curvature. Objects far from the ball, in the flat regions of the tablecloth, are unaffected by this local depression.

This is the universe. The tablecloth is the flat fabric. Each massive object — each star, each galaxy, each cluster — creates its own gravitational island. Matter accumulates within each island under local gravity. The flat regions between islands are dominated by dark energy.

2 Gravitational Islands

Definition 1 (Gravitational Island). *[Conceptual] A gravitational island is a region of spacetime characterized by a local curvature depression created by a concentration of mass M , described by the Schwarzschild metric for $r > r_s$:*

$$ds^2 = - \left(1 - \frac{2GM}{rc^2}\right) c^2 dt^2 + \left(1 - \frac{2GM}{rc^2}\right)^{-1} dr^2 + r^2 d\Omega^2 \quad (1)$$

Matter within the island's gravitational sphere of influence accumulates toward the central mass and does not escape to the flat background without sufficient kinetic energy.

Each galaxy is a gravitational island. Each galactic cluster is a larger island. Our Solar System is a small island within the larger island of the Milky Way, which is itself part of the island of the Local Group.

Remark 1. *The boundary of a gravitational island is not sharp like a black hole horizon. It is a soft boundary defined by the radius at which the local gravitational potential equals the cosmological expansion rate — the turnaround radius beyond which dark energy overcomes local gravity.*

2.1 Matter is confined to its island

A key property: matter originating in one gravitational island does not spontaneously migrate to another. The flat background between islands, dominated by dark energy, does not route matter from one local curvature to another.

Stars, planets, civilizations — they form within their island and remain there. An advanced civilization in a distant gravitational island, even if it emitted signals for billions of years, cannot send matter to our island. The geometry of the flat background does not provide a path.

This is a stronger statement than mere distance. Even if the distance were traversable in principle, the flat background offers no gravitational channel — no depression leading from one island to another.

3 The Chaining Web

3.1 The Chaining Force as global connector

The Chaining Force (Brindel, 2026a) propagates along null geodesics — the paths followed by light in curved spacetime. In the flat background between gravitational islands, null geodesics are straight lines. The Chaining Force propagates freely through the entire flat fabric, crossing from one island to another without being confined by local curvature.

This gives the Chaining Force a unique property that matter does not have: it is not confined to its island of origin. It propagates through the entire Chaining Web — the network of null geodesics spanning the flat fabric and passing through every gravitational island.

Definition 2 (Chaining Web). *[Speculative/Open] The Chaining Web is the network of null geodesics spanning the flat fabric of the universe, along which the Chaining Force $\tau \cdot \xi(x, t)$ propagates. It connects all gravitational islands simultaneously, carrying complexity information from old structures to young ones, without transporting matter between islands.*

3.2 Two levels of connectivity

The universe therefore has two distinct levels of connectivity:

1. **Matter connectivity** — local, confined to each gravitational island. Stars, planets, life, civilizations. Matter does not cross between islands.
2. **Chaining Web connectivity** — global, spanning the entire flat fabric. The Chaining Force crosses all islands. Complexity information propagates universally.

This is a fundamental distinction. Two civilizations in different gravitational islands share no matter, no light exchange (if beyond the cosmological horizon), no causal contact in the classical sense. But they are both embedded in the same Chaining Web. They both accumulate τ . They both approach τ_{crit} at rates determined by their local mass M and distance r .

They are connected by complexity — not by matter or light.

3.3 Stars that will never reach us

A direct consequence: there exist stars, planetary systems, and possibly civilizations whose matter trajectories never intersect our gravitational island. Their Chaining Force passes through our island — contributing to our local $\xi(x, t)$ — but their matter never arrives.

They are not merely distant. They are geometrically disconnected from us at the matter level. The flat background between us offers no gravitational channel toward our island. Their light, if beyond the cosmological horizon, never arrives either.

These worlds exist in the same Chaining Web as us. But we will never see them, never receive their matter, never detect their signals by any classical means.

Conjecture 1 (Island Isolation Conjecture). *[Open] The fraction of stellar systems whose matter trajectories never intersect our gravitational island is $(1 - f_{\text{local}})$, where f_{local} is the fraction of the observable universe’s matter within our Local Group’s gravitational sphere of influence. Current estimates suggest $f_{\text{local}} \ll 1$: the vast majority of stellar systems are forever materially isolated from us.*

4 Implications

4.1 A new geometric interpretation of the Fermi paradox

The Fermi paradox asks: if intelligent civilizations are common, why do we detect no signals? Two answers from this framework:

1. **Dark energy isolation** (Brindel, 2026b): civilizations beyond the cosmological horizon are causally disconnected. Their signals never arrive.
2. **Island isolation** (this paper): civilizations in other gravitational islands, even within the observable universe, send no matter toward us. Their light may in principle reach us, but the Chaining Web — not classical signals — is their primary channel of influence.

The silence is not the absence of life. It is the geometry of the flat fabric, which routes the Chaining Force universally but matter only locally.

4.2 The Chaining Force as universal synchronizer

The Chaining Web connects all islands. Every gravitational island accumulates τ . Every island approaches τ_{crit} according to its local parameters. Every island contributes to the stochastic field $\xi(x, t)$ that propagates through the Web.

In this sense, all gravitational islands are synchronized by the Chaining Web — not in their matter content, but in their complexity trajectory. They all follow the same equation:

$$\square\phi + \frac{2GM}{r}\phi = \tau \cdot \xi(x, t) \quad (2)$$

with the same universal constants G , c , and $\langle \xi^2 \rangle = 4.95 \times 10^{-35} \text{ m}^4\text{s}^{-6}$ (calibrated on the Solar System, Brindel 2026a).

The universe is not a collection of isolated islands. It is a collection of islands connected by a universal complexity current.

5 Open Problems

1. **Island boundaries:** how precisely can the boundary of a gravitational island be defined observationally? Is it related to the splashback radius observed in galaxy clusters?
2. **Chaining Web topology:** what is the topology of the network of null geodesics connecting gravitational islands? Is it scale-free? Does it have hubs?
3. **Inter-island Chaining Force:** does the Chaining Force from a distant island measurably affect our local $\xi(x, t)$? Could this be detected as an anisotropy in the stochastic field?
4. **Fermi prediction:** the island isolation conjecture predicts that the fraction of civilizations detectable by classical means is f_{local} . Is this consistent with existing SETI null results?

6 Discussion and Scope

This paper is explicitly speculative. The Chaining Force is a hypothetical framework without experimental confirmation. The tablecloth picture is a conceptual model, not a derivation from first principles.

The central contribution is a new way of thinking about cosmic structure: not as a collection of isolated objects, but as a two-level system — gravitational islands at the matter level, connected by a universal Chaining Web at the complexity level.

This picture unifies several of the author’s previous conjectures — the Chaining Force, the Symbolic Arithmetic programme, and the response to the Fermi paradox — into a single coherent geometric framework.

We present it as an open problem for theoretical cosmology.

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